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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,436	02/20/2001	Shinji Takeda	TM&K0007	8173

7590 06/04/2003
Joerg-Uwe Szipl
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EXAMINER

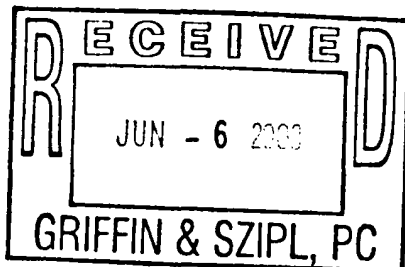
GEYER, SCOTT B

ART UNIT PAPER NUMBER

2829

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.



Office Action Summary

Application No.

09/785,436

Applicant(s)

MAEKAWA ET AL

Examiner

Scott B. Geyer

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 38 and 49-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 38 and 49-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 04 April 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 08/981,702.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 18,21
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

1. The previous notification of allowable subject matter, namely claims 38 and 49-54, is withdrawn in view of newly applied reference: US Pat 6,099,678 (Kotato et al.). Accordingly, the instant office action is non-final.

Information Disclosure Statement

2. The references cited within the information disclosure statement, received on September 20, 2002 and entered as paper no. 18, have been considered.

/

3. The information disclosure statement received on January 3rd, 2003 and entered as paper no. 21 has been reviewed and the following is noted:

3A. The information disclosure statement filed January 3rd, 2003 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The following references did not have a corresponding copy with the IDS form: A-Z, AA, AC, AE-AW, BA-BG, BI-BL and BP.

3B. The applicant is hereby notified that the following references from IDS paper no. 22 are repeats from previous IDS papers already on file: AB, AD, AX, AY, AZ, BH, BM, BN and BO. As such, these references are initialed as considered, but are also 'lined-through' on the IDS paper copy.

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Drawings

4. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on April 4th, 2003 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Specification

5. The specification as amended by the applicant is acceptable.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 38 and 49-54 are rejected under 35 U.S.C. 102(e) as being anticipated by Kotato et al. (6,099,678)

7A. The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this

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application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

7B. As to *claim 38*, Kotato et al. teach a process for fabricating a semiconductor device, comprising the steps of attaching the semiconductor chip to a support member with a die-bonding material, and encapsulating the semiconductor chip with a resin, as is shown by figures 11(a) through 11(e). Kotato et al. also teach a filmy die bonding material made from a resin such as epoxy resin, silicone resin, acrylic resin or polyimide resin (column 2, lines 23-26). Further, Kotato et al. teach mounting a chip onto the filmy die bonding material (see figure 11(c) and 11(d)). Kotato et al. also teach attaching the chip under the following conditions: temperature of 150°C to 250°C and bonding time of 0.1 seconds to 2 seconds (column 8, lines 43-45). Kotato et al. also teach a pressure of 100 to 5000g (column 8, line 45). Although Kotato et al. does not explicitly list pressures as gf/mm², the pressures in column 8, line 45, taken in conjunction with the chip size of 8x10 mm (i.e. 80 mm²) or 10x15 mm (i.e. 150 mm²) which are listed for numerous examples in columns 11-19 provide the following pressure ranges: for a 8x10 chip with pressure of 100g to 5000g – 1.25 gf/ mm² to 62.5 gf/ mm² and for a 10x15 chip with a pressure of 100g to 5000g – 0.67 gf/ mm² to 33.3 gf/ mm². Thus Kotato et al. teach the recited conditions for attaching a chip to a filmy die bonding material.

7C. As to *claim 49*, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach a water absorption rate less than 1.5 volume % (column 9, lines 25-27).

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7D. As to **claim 50**, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach a residual volatile component in an amount not more than 3.0% by weight (column 9, lines 31-32).

7E. As to **claim 51**, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach the modulus of elasticity of 10 Mpa or less at a temperature of 250°C (column 6, lines 1-5).

7F. As to **claim 52**, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach a void volume of 10% or less within the die-bonding material and an interface between the die-bonding material and an associated support member (column 9, lines 35-40).

7G. As to **claim 53**, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach the die-bonding material having a peel strength of 0.5 kgf/5x5 mm chip or above when the chip has been bonded to the support member (column 9, lines 41-45).

7H. As to **claim 54**, Kotato et al. teach a filmy die bonding material as noted above in paragraph 7B. Kotato et al. further teach the die-bonding material having a planar dimension not larger than the dimension of the chip and not having a protrusion outward from a region of the chip at a stage where the chip has been bonded to the support member (table 8, samples 3-5).

7I. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

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Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: scott.geyer@uspto.gov

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SBG

SBG
May 21, 2003



KAMAND CUNEO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Notice of References Cited

Application/Control No.

09/785,436

Applicant(s)/Patent Under

Reexamination

MAEKAWA ET AL.

Examiner

Scott B. Geyer

Art Unit

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Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,099,678	08-2000	Kotato et al.	156/256
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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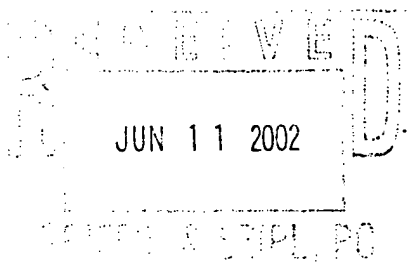
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/543,247	04/05/2000	Shinji Takeda	7426-063	6907

7590

06/06/2002

GRIFFIN & SZIPL, PC
2300 NINTH STREET SOUTH
SUITE PH-1
ARLINGTON, VA 22204-2320



7MK 004

EXAMINER
GRAYBILL, DAVID E
ART UNIT
PAPER NUMBER

2827

DATE MAILED: 06/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/543,247

Applicant(s)

TAKEDA ET AL

Examiner

David E Graybill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-23,35,40,42-45 and 50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-23,35,40,42-45 and 50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a)
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10-12
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other _____

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The information disclosure statement filed 11-01-01 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Specifically, copies of references P through W have not been provided. It has been placed in the application file, but the information referred to therein for references P through W has not been considered.

The 37 CFR 1.132 declaration by Genichi Matsumoto filed 03-11-02 is moot because Yusa is no longer relied on to reject the claims.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2)

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voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

In the rejections infra, reference labels are generally recited only for the first recitation of identical claim language.

Claims 17, 19, 20, 23, 35, 40, 42-45 and 50 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsura (6372080).

At column 3, lines 12-18 and 37-56; column 4, lines 1-11; column 9, lines 12-40; column 10, lines 41-53; column 12, line 1 to column 13, line 40; and column 14, line to column 15, line 7, Matsura teaches the following:

17. A material comprising an organic die-bonding film 1 having a water absorption of 1.5% by volume or less ["3 wt. % or less"], and the material includes a component that comprises an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

19. A material according to 17, having a peel strength of 0.5 kgf/5 mm x 5-mm chip or higher ["1.2 kN/m"] when a semiconductor has been bonded to a support member using said material.

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20. A material according to 18, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

23. A material according to 22, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

35. A material according to 17, said component including a polyimide resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

42. A method of bonding a semiconductor chip to a support member, the method comprising the steps of: providing a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin wherein the epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin; and bonding a semiconductor chip 2 to a support member 3 using the material.

43. A method of bonding according to 42, wherein said bonding is carried out at a temperature of 100-350°C for a time period of 0.1 second - 20 seconds with a pressure of 0.1 - 20gf/mm².

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44. A method of bonding according to 43, wherein said bonding is carried out a temperature of 150 - 250°C for a time period not longer than 2 seconds, with a pressure of 4 gf/mm² or less.

45. A method of bonding according to 44, wherein said bonding is carried out for a time period 1.5 seconds or less, with a pressure of 0.3 - 2 gf/mm².

50. A semiconductor device comprising: a semiconductor chip; a support member; and a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin, wherein the material is provided between the semiconductor chip and the support member.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 17 and 40 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takigawa (5659003).

At column 1, lines 20-32 and 64-67; column 2, lines 11-16; column 4, lines 33-44; column 8, lines 3-8; column 9, lines 61-63; column 10, lines 1-6; column 25, lines 31-54; column 31, lines 37-42; column 49, line 1 to column 50, line 54; and column 65, line 13, Takigawa teaches the following:

17. A material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes a component that comprises an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

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To further clarify the teaching of a material comprising an organic die-bonding film, it is noted that, as cited, Takigawa teaches that the material comprises an organic, adhesive agent, coating material, protective film for electronic devices, particularly semiconductor chips. In any case, this statement of intended use does not result in a structural difference between the claimed composition and the composition of Takigawa. Further, because the composition of Takigawa is inherently capable of being used for the intended use the statement of intended use does not patentably distinguish the claimed composition from the composition of Takigawa. Claims directed to composition must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959).

To further clarify the teaching of a water absorption of 1.5% by volume or less, it is noted that, as cited, Takigawa teaches that the water absorption is .1% by the method specified in JIS K-6911, which weight percent specified by the method is equivalent to 1.5% or less by volume.

Because Takigawa does not appear to teach verbatim a water absorption of 1.5% by volume or less, in the alternative, it is noted that Takigawa teaches that water absorption is a result-effective variable, and that minimal water absorption is

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desirable. Moreover, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed water absorption values because applicant has not disclosed that the values are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the composition would possess utility using another value. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II):

"Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056

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(Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.' In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results."

Claims 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takigawa (5659004).

Takigawa is applied for the same reason it was applied to claim 17, and is further applied infra.

Takigawa does not appear to explicitly teach the following:

18. A material according to 17, having a saturation moisture absorption of 1.0% by volume or less.

21. A material according to 20, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

22. A material according to 17, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

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In any case, as cited, Takigawa teaches that moisture absorption and modulus of elasticity ["elastic modulus"] are result-effective variables. Moreover, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed saturation moisture absorption and modulus of elasticity values because applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the composition would possess utility using another moisture absorption and modulus.

Claims 17, 19, 20, 23, 35, 40, 42-45 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita (5406124) and Takigawa (5659004).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35; column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30 Morita teaches the following:

17. A material comprising an organic die-bonding film 4 having a water absorption of 1.5% by volume or less ["less than 1.2%"],

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and the material includes a component that comprises an epoxy resin.

22. A material according to 17, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

35. A material according to 17, said component including a polyimide resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

42. A method of bonding a semiconductor chip to a support member, the method comprising the steps of: providing a material comprising an organic die-bonding film 4 having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin; and bonding a semiconductor chip 1 to a support member 6 using the material.

43. A method of bonding according to 42, wherein said bonding is carried out at a temperature of 100-350°C for a time period of 0.1 second - 20 seconds with a pressure of 0.1 - 20gf/mm².

44. A method of bonding according to 43, wherein said bonding is carried out a temperature of 150 - 250°C for a time period not longer than 2 seconds, with a pressure of 4 gf/mm² or less.

45. A method of bonding according to 44, wherein said bonding is carried out for a time period 1.5 seconds or less, with a pressure of 0.3 - 2 gf/mm².

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50. A semiconductor device comprising: a semiconductor chip; a support member; and a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin, wherein the material is provided between the semiconductor chip and the support member.

To further clarify the teaching of a water absorption of 1.5% by volume or less, it is noted that although Morita does not explicitly teach that the water absorption is measured by volume, it is inherent that the absorption ranges are either equal or unequal. If the ranges are equal, of course, Morita anticipates the claimed invention. If the ranges are unequal, regardless of the particular units of measure, the range less than 1.2% overlaps, and again anticipates, the range 1.5% by volume or less between and including the lesser of the upper range limits 1.2% and 1.5% by volume and the shared (hence anticipated) lower limit zero.

However, Morita does not appear to explicitly teach wherein the epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

Nonetheless, as cited supra, Takigawa teaches wherein an epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin. Moreover, it would have

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been obvious to combine the invention of Takigawa with the invention of Morita because it would provide an epoxy resin.

Also, although Morita teaches when a semiconductor has been bonded to a support member using the material, Morita does not appear to teach verbatim the following:

19. A material according to 17, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material.

23. A material according to 22, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

Moreover, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material because the conversion factor between the two peel strength units could not be readily determined. Still, as cited, Morita teaches that peel strength is a result-effective variable, and that an increase in peel strength is desirable. In addition, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular

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claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the invention would possess utility using another range.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Takigawa as applied to claim 17, and further in combination with Hozoji (JP5218107).

The combination of Morita and Takigawa does not appear to explicitly teach the following:

18. A material according to 17, having a saturation moisture absorption of 1.0% by volume or less.

Notwithstanding, in the English abstract and Table 1, Hozoji teaches this limitation. Furthermore, it would have been obvious to combine the invention of Hozoji with the invention of the applied prior art because it would facilitate adhesion.

Also, although Morita teaches when a semiconductor has been bonded to a support member using the material, Morita does not appear to teach verbatim the following:

20. A material according to 18, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

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Moreover, it cannot be determined if the teaching of Morita of a 90 degree peel strength of $67\text{g}/10\text{mm}^2$ chip is equivalent to the instant disclosure of a 17 degree peel strength of $0.5\text{ kgf}/5\text{ mm} \times 5\text{ mm}$ chip or higher when a semiconductor has been bonded to a support member using said material because the conversion factor between the two peel strength units could not be readily determined. Still, as cited, Morita teaches that peel strength is a result-effective variable, and that an increase in peel strength is desirable. In addition, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the invention would possess utility using another range.

Also, in the combination, Morita teaches the following:

21. A material according to 20, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C .

Applicant's amendment and remarks filed 3-11-02 are addressed in the rejection supra and are further addressed infra.

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The 37 CFR 1.132 declaration by Masuko Takashi filed 3-11-02 is insufficient to overcome the rejection of claims based upon Morita as set forth in the last Office action because it does not refer to the individual claims of the application. Thus, there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims. See MPEP § 716.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

Applicant is required to acknowledge whether the teaching of Morita of a 90 degree peel strength of 67g/10mm chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material. In addition, applicant is required to supply the conversion factor used to convert between the units.

Applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56.

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Where applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This Office action has a requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the requirement for information. The time period for reply to the requirement coincides with the time period for reply to this Office action.

The prior art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated

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from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist whose telephone number is 703-308-1782.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/305-3431.

David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
30-May-02

Notice of References Cited	Application/Control No. 09/543,247	Applicant(s)/Patent Under Reexamination TAKEDA ET AL.	
	Examiner David E Graybill	Art Unit 2827	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,372,080	04-2002	Matsuura et al.	156/313
	B	US-2001/0015484	04-2001	Matsuura et al.	257/678
	C	US-5,827,908	10-1998	Arai et al.	523/212
	D	US-5,319,005	06-1994	Hagiwara et al.	523/435
	E	US-6,046,072	04-2000	Matsuura et al.	438/106
	F	US-6,248,613	06-2001	Matsuura et al.	438/106
	G	US-5,476,908	12-1995	Kishi et al.	525/393
	H	US-5,238,730	08-1993	Hanawa et al.	442/117
	I	US-5,659,004	08-1997	Takigawa et al.	523/443
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	JP 07090239 A	04-1995	Japan		C08G 59/24
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
 Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



UNITED STATES DEPARTMENT OF COMMERCE

Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/616,943 07/14/00 TAKEDA

TM&K0005

EXAMINER

024203

IM22/1029

GRIFFIN & SZIPL, PC

SUITE PH-1

2300 NINTH STREET, SOUTH

ARLINGTON VA 22204

MITCH, P

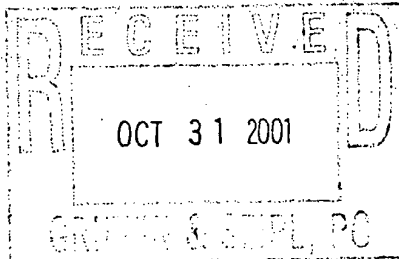
ART UNIT

PAPER NUMBER

1714

DATE MAILED:

10/29/01



Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No. _____

Applicant(s) _____

Examiner _____

Group/Art Unit _____

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Response

A SHORTENED STATUTORY PERIOD FOR RESPONSE IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a response be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for response is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to respond within the set or extended period for response will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- ☒ Responsive to communication(s) filed on 10/9/01
- ☐ This action is FINAL.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 40-56 is/are pending in the application.
- ☐ Of the above claim(s) 54-56 is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 40-56 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
- ☐ received in Application No. (Series Code/Serial Number) _____
- ☐ received in this national stage application from the International Bureau (PCT Rule 1.7.2(a)).

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____ ☐ Interview Summary, PTO-413
- ☒ Notice of References Cited, PTO-892 ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948 ☐ Other _____

Office Action Summary

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Claims 54-56 are withdrawn from consideration for being directed to the non-elected invention. Applicants' traversal of the restriction requirement is noted. The Examiner believes that the restriction requirement is proper. Claims 40-53 are directed to a film. A film has utility other than in the semiconductor device of claims 54-56. The restriction requirement is FINAL.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

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Claims 40-53 are rejected under 35 U.S.C. § 102(b) as being anticipated by Alvino or Tanaka or Goswami or Iijima.

Claims 40-53 are rejected under 35 U.S.C. § 102(e) as being anticipated by Angelopoulos or Nguyen or Schlueter. Applicants' claims are directed to a film. Claim 50 recites epoxy resin or polyimide resin. Claims 51-53 recite filler. All of these references disclose film. Alvino discloses polyimide and filler in the Abstract. Tanaka discloses epoxy resin and filler in the Abstract. See column 6, lines 5-17 for filler. Goswami discloses polyimide in the Abstract. See column 6, lines 30-63 for filler. Iijima discloses polyimide film and silver filler in claim 6. Angelopoulos discloses polyimide film in column 8, line 14 and silver filler in column 2, line 63. Nguyen discloses a polymer film with silver filler in claims 1, 3, and 21. Schlueter discloses polyimide film with filler in the Abstract. Applicants' claims lack novelty over the films of these references.

Claims 40-53 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Alvino or Tanaka or Goswami or Iijima or Angelopoulos or Nguyen or Schlueter. It would be obvious to one of ordinary skill in the art to form film comprising polymer disclosed by these references and filler such as silver. The motivation is that it would be within the skill of one in the art

Serial No. 09/616,943

-4-

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to form such films by following the instructions of these references.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Michl whose telephone number is (703) 308-2451. The examiner can normally be reached on Monday through Friday from 7:30 A.M. to 4 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan, can be reached on (703) 306-2777. The fax phone number for this Group is (703) 305-5885.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-2351.

PRMichl:cdc

October 24, 2001


PAUL R. MICHL
PATENT EXAMINER
ART UNIT 156

Notice of References Cited

Application No.

Applicant(s)

616943

Examiner

Michl

Group Art Unit

1714

Pag 1 of 1

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	3608054	9/71	Alvino	264	309
B	4460718	7/84	Tanaka	523	400
C	4604230	8/86	Goswami	252	514
D	4755415	7/88	Iijima	428	163
E	5985458	11/99	Angelopoulos	428	418
F	5989459	11/99	Nguyen	252	503
G	6201945	3/01	Schlueter	399	329
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
X		

A copy of this reference is not being furnished with this Office action.
(See Manual of Patent Examining Procedure, Section 707.05(a).)

Part of Paper No.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,194	02/20/2001	Shinji Takeda	TM&K0006	5211

24203 7590 12/24/2002

GRIFFIN & SZIPL, PC
SUITE PH-1
2300 NINTH STREET, SOUTH
ARLINGTON, VA 22204

DEC 27 2002

EXAMINER

GRAYBILL, DAVID E

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 12/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/785,194

Applicant(s)

TAKEDA ET AL.

Examiner

David E Graybill

Art Unit

2827

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☒ Interview Summary (PTO-413) Paper No(s). 17
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 12 6) ☐ Other:

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The following is a quotation of the second paragraph of 35

U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 31 the limitation "the support member" is unclear because the limitation refers to a "support member" but there is no apparent previous claim-recitation of a support member.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

In the rejections infra, reference labels are generally recited only for the first recitation of identical claim language.

Claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Morita (5406124).

At column 3, line 63 to column 4, line 35, column 7, lines 6-9, column 8, lines 1-8 and 24-47, column 9, lines 14-35, column 10, lines 14-15, column 14, lines 3-14 and 40-46, column 16, lines 18-34, column 17, lines 13-14, and column 18, lines 1-10 and 29-30, Morita teaches the following:

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25. A process for fabricating a semiconductor device, comprising the step of: bonding a semiconductor device 1 to a support 2 with an organic die-bonding film 4 at conditions of temperature of 100-250°C ["250°C"] and pressure of 0.1-30 gf/mm² ["1 to 50kg/cm²"] to produce a bonded chip wherein the organic die-bonding film has a peel strength of 0.5 kgf/(5 mm x 5mm chip) or higher.

26. A process according to 25, further comprising the step of: encapsulating 3 the bonded chip to produce the semiconductor device.

27. A process according to 25, wherein said step of bonding comprises bonding with an organic die-bonding film having a modulus of elasticity of 10 Mpa or less at a temperature of 250°C.

28. A process according to 27, wherein said step of bonding comprises bonding with an organic die-bonding film further having a water absorption of 1.5% by volume or less.

29. A process according to 28, wherein said step of bonding comprises bonding with an organic die-bonding film further having a residual volatile component in an amount of not more than 3.0% by weight.

30. A process according to 29, wherein said step of bonding comprises bonding with an organic die-bonding film further

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having a saturation moisture absorption of 1.0% by volume or less.

33. A process according to 25, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

36. A process according to 25, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

48. A process according to 36, wherein the polyimide is a polyimide synthesized from a combination which is selected from the group consisting of a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5dimethylphenyl)methane; a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and 4,4'-diaminodiphenylether; a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5-diisopropylphenyl)methane; a combination of

1,2(ethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane; a combination of a mixture of 1,2-(ethylene)bis(trimellitate anhydride) and

1,10(decamethylene)bis(trimellitate anhydride) being the same mol as the mixture and 2,2bis[4-(4-aminophenoxy)phenyl] propane;

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and a combination of 1,10(decamethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane.

49. A process according to 25, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.

52. A process according to 25, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.

55. A process according to 25, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².

58. A process according to 49, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².

59. A process according to 52, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².

60. A process according to 25, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

63. A process according to 49, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

64. A process according to 52, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

65. A semiconductor device made by the process of 25.

To further clarify the teaching of a pressure of 0.1-30 gf/mm², it is noted that the teaching of Morita of a pressure of

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1 kg/cm² is equivalent a teaching of a pressure of 10 gf/mm², and a pressure of 10 gf/mm² anticipates the claimed pressure. Still further, the unit kg/cm² is a conventional alternative expression of the unit kgf/cm² as evidenced by Hattori (4990092), at column 9, lines 58-59, and Tsuihiji (6299513), at column 18, line 22. Indeed, this alternate expression is consistent with the teaching of Morita that St. Clair (4543295) teaches "pressure ranges 3 to 21kg/cm²," in view of the teaching of St. Clair of pressure ranges of 50 to 300 psi. See Morita, column 2, lines 49-52, and St. Clair, column 4, lines 55-58, column 5, lines 6-8, column 6, lines 56-67, and column 9, lines 1-5.

To further clarify the teaching of a water absorption of 1.5% by volume or less, the teaching of Morita of "less than 1.2%" anticipates this limitation. In particular, although Morita does not appear to explicitly specify whether the measure is by volume or by weight, both specific examples of 1.2% by volume and 1.2% by weight fall within the claimed range. Moreover, both ranges of 1.2% by volume or less and 1.2% by weight or less fall within the claimed range, with the common lower limit of the ranges equal to zero percent.

In the alternative, Morita teaches that percent water absorption is a result-effective variable. Therefore, it would have been an obvious matter of design choice bounded by well

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known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed percent water absorption limitation because applicant has not disclosed that the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another water absorption. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II):

"Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant

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can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.' In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results."

To further clarify the teaching of the limitation, "to produce a bonded chip wherein the organic die-bonding film has a peel strength of 0.5 kgf/(5 mm x 5mm chip) or higher," it is noted that this limitation is merely a statement of intended result which does not result in a manipulative difference as compared to the process of Morita. Furthermore, because the process of Morita is inherently capable of being used to achieve the same intended result, the statement of intended result does not patentably distinguish the claimed process from the process of Morita.

Because applicant insists on a unique interpretation of the claims; namely that the claimed process results in a peel

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strength of 0.5 kgf/(5 mm x 5mm chip) or higher, and to continue to afford applicant the benefit of compact prosecution, in the alternative, the claims are further rejected over Morita.

In particular, Morita does not appear to explicitly teach that the process results in a peel strength of 0.5 kgf/(5 mm x 5mm chip) or higher. Furthermore, it cannot be determined if the largest explicitly taught peel strength of Morita; namely a 90 degree peel strength of 67g/10mm² chip, is equivalent to the claimed peel strength of 0.5 kgf/(5 mm x 5mm chip) or higher because the conversion factor between the two different peel strength measuring techniques cannot be determined.

Nonetheless, as cited, Morita teaches all of the process limitations that result in the claimed peel strength; therefore, the claimed peel strength is an inherent result of the process of Morita.

In any case, Morita teaches that an increase in peel strength is desirable. Hence, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the

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product and process would possess utility using another range.

As set forth supra, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.

Claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Hozoji (JP5-218107).

Morita does not appear to explicitly teach the following:

31. A process according to 30, wherein said step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the film.

Nonetheless, in the English abstract and Table 1, Hozoji teaches wherein a step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the

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film. Moreover, it would have been obvious to combine the process of Hozoji with the process of Morita because it would facilitate adhesion.

To further clarify the teaching of a void volume of 10% or less, it is noted that Hozoji teaches that a defect such as a void, etc., is eliminated.

In addition, in the combination, Morita teaches the following:

32. A process according to 31, further comprising the step of: encapsulating the bonded chip to produce the semiconductor device.

34. A process according to 31, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

35. A process according to 32, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

37. A process according to 31, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

38. A process according to 32, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

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50. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.
51. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.
53. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.
54. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.
56. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².
57. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².
61. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².
62. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

Claims 39, 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33,

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36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Sakumoto (5277972).

Morita does not appear to explicitly teach the following:

- 39. A process according to 25, wherein said die-bonding material is a film comprising an acrylic resin and epoxy resin.
- 42. A process according to 25, wherein said die-bonding material is a film comprising a silicone resin.
- 45. A process according to claim 25, wherein said die-bonding material is a film comprising a silicone resin and epoxy resin.

Nevertheless, at column 1, lines 14-17, column 2, lines 11-13, and column 9, lines 26-29, Sakumoto teaches a process wherein a die-bonding material is a film comprising an acrylic resin, an epoxy resin, and a silicone resin. Moreover, it would have been obvious to combine the process of Sakumoto with the process of Morita because it would provide an adhesive material.

Although Sakumoto does not appear to explicitly teach the particular claimed combinations of acrylic and epoxy resin, and silicone and epoxy resin, these combinations would have been an obvious matter of routine observation and experimentation. Indeed, "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose [T]he idea of combining them

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flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (Claims to a process of preparing a spray - dried detergent by mixing together two conventional spray - dried detergents were held to be prima facie obvious.). See also, In re Crockett, 279 F.2d 274, 126 USPQ 186 (CCPA 1960) (Claims directed to a method and material for treating cast iron using a mixture comprising calcium carbide and magnesium oxide were held unpatentable over prior art disclosures that the aforementioned components individually promote the formation of a nodular structure in cast iron.); and Ex parte Quadranti 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992) (Mixture of two known herbicides held prima facie obvious).

Claims 40, 41, 43, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Hozoji as applied to claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62, and further in combination with Sakumoto (5277972).

Sakumoto is applied for the same reason it was applied to claims 39, 42 and 45.

The Declaration under 37 CFR 1.132 filed 6-25-2 is insufficient to overcome the rejection of claims 25-65 for the following reasons:

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The Declaration is insufficient because it refers only to the system described in the instant application and not to the individual claims of the application. Thus, there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims. See MPEP § 716.

The Declaration is also insufficient because the objective evidence of nonobviousness is not commensurate in scope with the claims. In particular, the showing of unexpected results are not reviewed to determine whether the results occur over the entire claimed range. In re Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980).

Similarly, the Declaration is insufficient because it does not compare the claimed invention with the closest prior art which is commensurate in scope with the claims. For example, a polyimide of the claimed invention is compared to a different polyimide of the "closest" prior art; yet, both the closest prior art and the instant claims recite an identical polyimide. For that matter, as set forth in the rejection, Morita explicitly teaches all of the process limitations of the instant claims; therefore, the closest prior art of Morita includes all of the limitations of the claims.

Also, in the remarks filed 10-11-2, applicant admits that it cannot be determined if the teaching of Morita of a 90 degree

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peel strength of 67g/10mm² chip is equivalent to the claimed peel strength. Yet applicant also declares that the claimed peel strength is an unexpected result in relation to the peel strength of Morita. This declaration of unexpected results is respectfully traversed because the claimed result cannot be declared unexpected in relation to the peel strength of Morita when the relationship to the peel strength of Morita cannot be determined.

In any case, at column 7, lines 65-68, Morita teaches unexpected results; therefore, the unexpected results alleged in the Declaration are not unexpected.

In view of the foregoing, when all of the evidence presented in the Declaration is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Applicant's amendment and remarks filed 6-25-2 and 10-11-2 have been fully considered, are addressed in the rejection supra and are further addressed infra.

Also, applicant alleges that the Office "admits that the Morita reference does not disclose a '17 degree peel strength of 0.5 Kgf/5mm x 5mm chip or above [sic]." This allegation is respectfully traversed because this is not admitted; rather, it is maintained that "Morita does not appear to explicitly teach

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that the process results in a peel strength of 0.5 kgf/(5 mm x 5mm chip) or higher."

The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to Group 2800 Customer Service whose telephone number is 703-306-3329.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/3087724.

David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
19-Dec-02

Notice of References Cited

Application/Control No.

09/785,194

Applicant(s)/Patent Under

Reexamination

TAKEDA ET AL.

Examiner

David E Graybill

Art Unit

2827

Pag 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
1	A	US-4,543,295	09-1985	St. Clair et al.	428/458
2	B	US-6,299,513	10-2001	Tsuihiji et al.	451/88
3	C	US-6,097,089	08-2000	Gaku et al.	257/712
4	D	US-4,990,292	02-1991	Hattori et al.	264/426
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,194	02/20/2001	Shinji Takeda	TM&K0006	5211

24203 7590 12/26/2001

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EXAMINER

GRAYBILL, DAVID E

ART UNIT PAPER NUMBER

2814

JAN - 2 2002

DATE MAILED: 12/26/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/785-194

Applicant(s)

SHINJI TAKEDA

Examiner

David E Graybill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/981,702.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5,7-9
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita (5406124).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35;

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column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30, Morita teaches the following:

25. A process for fabricating a semiconductor device, comprising the step of: bonding a semiconductor device 1 to a support 2 with an organic die-bonding film 4 at conditions of temperature of 100-250°C and pressure of 0.1-30 gf/mm² to produce a bonded chip wherein the organic die-bonding film has a peel strength.

26. A process according to 25, further comprising the step of: encapsulating 3 the bonded chip to produce the semiconductor device.

27. A process according to 25, wherein said step of bonding comprises bonding with an organic die-bonding film having a modulus of elasticity of 10 Mpa or less at a temperature of 250°C.

28. A process according to 27, wherein said step of bonding comprises bonding with an organic die-bonding film further having a water absorption of 1.5% by volume or less.

29. A process according to 28, wherein said step of bonding comprises bonding with an organic die-bonding film further having a residual volatile component in an amount of not more than 3.0% by weight.

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30. A process according to 29, wherein said step of bonding comprises bonding with an organic die-bonding film further having a saturation moisture absorption of 1.0% by volume or less.

33. A process according to 25, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

36. A process according to 25, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

48. A process according to 36, wherein the polyimide is a polyimide syntesized from a combination which is selected from the group consisting of a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and bis(4-amino-

3,5dimethylphenyl)methane; a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and 4,4'-

diaminodiphenylether; a combination of 1,2-

(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5-

diisopropylphenyl)methane; a combination of

1,2(ethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-

aminophenoxy)phenyl] propane; a combination of a mixture of 1,2-

(ethylene)bis(trimellitate anhydride) and

1,10(decamethylene)bis(trimellitate anhydride) being the same

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mol as the mixture and 2,2bis[4-(4-aminophenoxy)phenyl] propane;
and a combination of 1,10(decamethylene)bis(trimellitate
anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane.

49. A process according to 25, wherein said step of bonding is
carried out with a bonding time of from 0.1 seconds (inclusive)
to 2 seconds.

52. A process according to 25, wherein said step of bonding is
carried out with a bonding time of from 0.1 seconds (inclusive)
to 1.5 seconds.

55. A process according to 25, wherein said step of bonding is
carried out at a pressure of 0.1-4 gf/mm².

58. A process according to 49, wherein said step of bonding is
carried out at a pressure of 0.1-4 gf/mm².

59. A process according to 52, wherein said step of bonding is
carried out at a pressure of 0.1-4 gf/mm².

60. A process according to 25, wherein said step of bonding is
carried out at a pressure of 0.3-2 gf/mm².

63. A process according to 49, wherein said step of bonding is
carried out at a pressure of 0.3-2 gf/mm².

64. A process according to 52, wherein said step of bonding is
carried out at a pressure of 0.3-2 gf/mm².

65. A semiconductor device made by the process of 25.

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Although Morita teaches a material at a stage where a semiconductor has been bonded to a support member using the material, Morita does not appear to explicitly teach that the material has a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher at the stage.

Furthermore, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 Kgf/5 x 5 mm chip or above because the conversion factor between the two different peel strength measuring techniques is unknown. Nonetheless, as cited, Morita teaches that an increase in peel strength is desirable, and it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious

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purpose, produce an unexpected result, or are otherwise critical.

In the interest of compact prosecution, applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that is reasonably necessary to the examination of this application.

In response to this requirement, please state the specific improvements of the subject matter in claim 30, specifically, the limitation, "a peel strength of 0.5 Kgf/5 x 5 mm chip or higher" over the disclosed teaching of Morita of a 90 degree peel strength of 67g/10mm², and indicate the specific elements in the claimed subject matter that provide those improvements.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

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Claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Hozoji (JP5-218107).

Morita does not appear to explicitly teach the following:

31. A process according to 30, wherein said step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the film.

Nonetheless, in the English abstract and Table 1, Hozoji teaches wherein a step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the film. Moreover, it would have been obvious to combine the process of Hozoji with the process of Morita because it would facilitate adhesion.

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To further clarify the teaching of a void volume of 10% or less, it is noted that Hozoji teaches that a defect such as a void, etc., is eliminated.

In addition, in the combination, Morita teaches the following:

32. A process according to 31, further comprising the step of: encapsulating the bonded chip to produce the semiconductor device.

34. A process according to 31, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

35. A process according to 32, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

37. A process according to 31, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

38. A process according to 32, , wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

50. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.

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51. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.

53. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.

54. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.

56. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².

57. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm².

61. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

62. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm².

Claims 39, 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Sakumoto (5277972).

Morita does not appear to explicitly teach the following:

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39. A process according to 25, wherein said die-bonding material is a film comprising an acrylic resin and epoxy resin.

42. A process according to 25, wherein said die-bonding material is a film comprising a silicone resin.

45. A process according to claim 25, wherein said die-bonding material is a film comprising a silicone resin and epoxy resin.

Nevertheless, at column 1, lines 14-17; column 2, lines 11-13, and column 9, lines 26-29, Sakumoto teaches a process wherein a die-bonding material is a film comprising an acrylic resin, an epoxy resin, and a silicone resin. Moreover, it would have been obvious to combine the process of Sakumoto with the process of Morita because it would provide an adhesive material.

Although Sakumoto does not appear to explicitly teach the particular claimed combinations of acrylic and epoxy resin, and silicone and epoxy resin, these combinations would have been an obvious matter of routine observation and experimentation.

Indeed, "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (Claims to a process of

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preparing a spray - dried detergent by mixing together two conventional spray - dried detergents were held to be prima facie obvious.). See also, In re Crockett, 279 F.2d 274, 126 USPQ 186 (CCPA 1960) (Claims directed to a method and material for treating cast iron using a mixture comprising calcium carbide and magnesium oxide were held unpatentable over prior art disclosures that the aforementioned components individually promote the formation of a nodular structure in cast iron.); and Ex parte Quadranti 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992) (Mixture of two known herbicides held prima facie obvious).

Claims 40, 41, 43, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Hozoji as applied to claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62, and further in combination with Sakumoto (5277972).

Sakumoto is applied for the same reason it was applied to claims 39, 42 and 45.

This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

Art Unit: 2814

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist whose telephone number is 703-308-1782.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/305-3431.

David E. Graybill
Primary Examiner
Art Unit 2814

D.G.
17-Dec-01

Notice of References Cited

Application/Contr. No.

09/785,194

Applicant(s)/Patent Under
Re examination
SHINJI TAKEDA

Examiner

David E Graybill

Art Unit

2814

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
Cited	A	US-5277972 /	01-1994	Sakumoto et al.	
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/875,330	06/25/97	KUTATO	7426-0046

TMK 0002

PENNIE & EDMONDS
1155 AVENUE OF THE AMERICAS
NEW YORK NY 10036-2711

IM31/0104

EXAMINER
MAYES, M

REFERRED TO REC'D
JAN 07 1999
Pennie & Edmonds
OK for filing

ART UNIT	PAPER NUMBER
1734	

DATE MAILED: 01/04/99

Amendment due 1/4/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Notice of References Cited

Application No.

08/875,330

Applicant(s)

Takeda et al.

Examiner

M. Curtis Mayes

Group Art Unit

1734

Page 1 of 2

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	5,360,942 ✓	11/94	Hoffman et al.	257	666X
B	4,875,279 ✓	10/89	Sakiadis	29	740
C	5,432,380 ✓	7/95	Jin et al.	257	676
D	5,145,099 ✓	9/92	Wood et al.	----	----
E	4,985,105 ✓	1/91	Masuda	156	261
F	5,204,399 ✓	4/93	Edelman	----	----
G	5,635,009 ✓	6/97	Kawamura et al.	156	261
H	5,605,763 ✓	2/97	Yusa et al.	----	----
I	5,406,124 ✓	4/95	Morita et al.	257	783
J	5,528,075 ✓	6/96	Burns	257	666
K	5,793,099 ✓	8/98	Murakami et al.	257	666
L	5,837,368 ✓	11/98	Hiroe et al.	257	666X
M	5,177,032 ✓	1/93	Fogal et al.	257	666X

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
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P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

DOCUMENT (Including Author, Title, Source, and Pertinent Pages)

DATE

U		
V		
W		
X		

Notice of References Cited

Application No.

08/875,330

Applicant(s)

Takeda et al.

Examiner

M. Curtis Mayes

Group Art Unit

1734

Page 2 of 2

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	5,512,628 ✓	4/96	Sakumoto et al.	----	----
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
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R						
S						
T						

NON-PATENT DOCUMENTS

DOCUMENT (Including Author, Title, Source, and Pertinent Pages)

DATE

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Office Action Summary

Application No.

08/875,330

Applicant(s)

Takeda et al.

Examiner

M. Curtis Mayes

Group Art Unit

1734



☐ Responsive to communication(s) filed on _____

☐ This action is **FINAL**.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-45 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

☒ Claim(s) 1-7, 9, and 11-45 is/are rejected.

☒ Claim(s) 8 and 10 is/are objected to.

Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on _____ is/are objected to by the Examiner.

The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been received.

received in Application No. (Series Code/Serial Number) _____

☒ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 1734

DETAILED ACTION

Response to Amendment

(1)

The amendments to claims 12-14, 19-26 and 30 in the preliminary amendment were not entered as written. Claims 12 was amended to read "Claim 8 or 9," Claim 13 amended to read "1-3, 8 and 9," Claims 19-26 amended to read "Claim 1 or 2, wherein said" and Claim 30 amended to read "machine according to."

Claim Objections

(2)

Claims 7, 27, 35, 39 and 45 are objected to because of the following informalities: in Claim 2 "according to any one of claims" should be "according to claim." In Claim 27, "described in any one of claims 1 to 2" should read "described in claim 1 or 2." In Claim 35, "laminating machine" should read "laminating apparatus" as claimed in Claim 28 or 29. In Claim 39, "material which has" should read "material has." In Claim 45, "sclaim" should read "claim." Appropriate correction is required.

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Claim Rejections - 35 USC § 112

(3)

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

(4)

Claim 30 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the compression-bonding device being one of the devices listed, does not reasonably provide enablement for the compression-bonding device being "at least one device" of the devices listed. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

While the specification provides support for a bonding device being any one of the listed devices, the specification is not enabling for the bonding device being more than one of the devices, which is encompassed by the "at least one device" as claimed.

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(5)

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(6)

Claims 41 and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 41 and 42 do not claim any method steps. As written the claims merely recite a preamble and contain no transition phrase (comprising, consisting of, etc.).

Claim Rejections - 35 USC § 102

(7)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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(8)

Claims 1, 9, 11-14, 21-27, 37, 38 and 40-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Hoffman et al.

Hoffman et al. disclose a method comprising: placing an adhesive film 44 on a preheated support substrate 20 of a leadframe; laminating the support substrate and an apertured substrate 42, such as a flexible polymeric substrate, using a pressure of 1-10 psi at cure temperature (250-375°C); bonding a semiconductor device 26 to the polymer adhesive by heating; and molding a polymer resin 60 about the module (col. 3-6).

(9)

Claims 1-6, 9, 11, 13, 17-19, 21-27, 29-35, 40 and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakiadis.

Sakiadis discloses a method of attaching a die attach to a bond site comprising: feeding a ribbon of polymeric adhesive material; cutting the ribbon to provide a die attach pad; drawing the pad with a pickup tool having at least two vacuum holes; placing the pad on a heated bond site of a leadframe while applying slight pressure to secure placement and transfer heat by which the adhesive is softened; and applying and laminating a chip atop the adhesive pad by mechanical means. The adhesive ribbon can be formed by solvent casting, the surface area of the adhesive pad should be at least 80% of the surface area of the chip and the face of the pickup tool may be flat, substantially flat or slightly convex and coated with a plastic coating of any suitable plastic (col. 3, lines 31-63, col. 4, lines 24-68, col. 5, lines 13-43, col. 8, lines 54-62).

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(10)

Claims 28, 29 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Wood et al.

Wood et al. disclose a method and apparatus for die attaching comprising: feeding a leadframe to first position 17 at which a cut section of polyimide material is pre-attached to the leadframe by a pick and place tool or a punch mechanism, with a thermode 19 to produce a controlled temperature; indexing the leadframe to a second position 20 where semiconductor device 20 is picked and placed on the thermoplastic material by die attach means 21, with thermode to apply a higher temperature; indexing the leadframe to a third position 22 where thermode 19 is employed at a different temperature to securely laminate all of the elements together (col. 6, line 38 - col. 7, line 29).

Claim Rejections - 35 USC § 103

(11)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was

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commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

(12)

Claim 37 is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jin et al. or Kawamura et al.

Jin et al. or Kawamura et al. each disclose a semiconductor chip package having a chip bonded to a leadframe by an organic film and sealed with a resin (Fig. 10 and 2b, respectively).

In the event any differences can be shown for the product of the product-by-process claim 37, as opposed to the product taught by the references Jin et al. or Kawamura et al., such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results; see also *In re Thorpe*, 227 USPQ 964 (CAFC 1985).

When the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claimed in a product-by-process claim, a rejection based alternatively on either section 102 or 103 of the statute is appropriate. As a practical matter, the Patent and Trademark Office is not equipped to manufacture products by the myriad of processes put before it and then obtain prior art products and make physical comparisons therewith. A lesser

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burden of proof is required to make out a case of prima facie obviousness for product-by-process claims because of their particular nature than when a product is claimed in the conventional fashion. *In re Brown*, 59 CCPA 1063, 173 USPQ 685 (1972); *In re Fessmann*, 180 USPQ 324 (CCPA 1974).

(13)

Claims 1-7, 9, 11, 13, 17-27, 29-35, 37, 38 and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakiadis in view of Hoffman et al.

Sakiadis discloses a method of attaching a die attach to a bond site comprising: feeding a ribbon of polymeric adhesive material; cutting the ribbon to provide a die attach pad; drawing the pad with a pickup tool having at least two vacuum holes; placing the pad on a heated bond site of a leadframe while applying slight pressure to secure placement and transfer heat by which the adhesive is softened; and applying and laminating a chip atop the adhesive pad by mechanical means. The adhesive ribbon can be formed by solvent casting, the surface area of the adhesive pad should be at least 80% of the surface area of the chip and the face of the pickup tool may be flat, substantially flat or slightly convex and coated with a plastic coating of any suitable plastic (col. 3, lines 31-63, col. 4, lines 24-68, col. 5, lines 13-43, col. 8, lines 54-62).

Hoffman et al. teach that in making a chip electronic package that is both reworkable and does not require accurate control of adhesive placement, at least one semiconductor chip is bonded to a leadframe using an apertured substrate laminated to the support substrate of the leadframe. The package is made by placing an adhesive film 44 on a preheated support substrate

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20 of a leadframe; laminating the support substrate and an apertured substrate 42, such as a flexible polymeric substrate, using a pressure of 1-10 psi at cure temperature (250-375°C); bonding a semiconductor device 26 to the polymer adhesive by heating; and molding a polymer resin 60 about the module (col. 1-6).

It would have been obvious to one of ordinary skill in the art to have modified the method of Sakiadis by laminating an apertured substrate on the adhesive pad using a pressure of 1-10 psi at cure temperature before laminating a chip on the adhesive as taught by Hoffman et al. for making a chip electronic package that is both reworkable and does not require accurate control of adhesive placement.

Forming the adhesive ribbon by solvent casting on a carrier film and peeling from the carrier film as claimed in Claim 20 would have been obvious to one of ordinary skill in the art as well known in the art for forming a ribbon by solvent casting.

Molding a polymer resin about the module as claimed in 37 would have been obvious to one of ordinary skill in the art as taught by Hoffman et al. and as well known in the art for encapsulating a chip bonded to a leadframe for forming a chip electronic package.

(14)

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al., Sakiadis or the references as applied to claim 1 above, and further in view of Masuda.

Masuda teaches that in a taping apparatus used for leadframes to punch the tape, the apparatus must be capable of punching a thin tape without exerting an excess tension force to cut

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the tape into members each having a required accuracy of the shape and dimension thereof (col. 1, line 64 - col. 2, line 2).

It would have been obvious to one of ordinary skill in the art to have modified the method of Hoffman et al., Sakiadis or the references as combined by providing the piece of adhesive film or ribbon by punching as taught by Masuda et al. as used for providing a piece of tape for a leadframe. Adjusting the tension of the film or ribbon as claimed in Claim 16 would have been obvious to one of ordinary skill in the art as taught by Masuda for punching a thin tape without exerting an excess tension force to cut the tape into members each having a required accuracy of the shape and dimension thereof. The particular tension would have been obvious to one of ordinary skill in the art for punching to cut the film or ribbon to the required accuracy of shape and dimension.

(15)

Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakiadis in view of Jin et al. or Kawamura et al.

Sealing the chip with resin after bonding to the leadframe would have been obvious to one of ordinary skill in the art as well known in the art for encapsulating the chip for forming a semiconductor package as taught by Jin et al. or Kawamura et al.

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(16)

Claims 28, 29, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood et al. in view of Hoffman et al.

Wood et al. disclose an apparatus for die attaching comprising: a first position 17 at which a cut section of polyimide material is pre-attached to the leadframe by a pick and place tool or a punch mechanism, with a thermode 19 to produce a controlled temperature; a second position 20 where semiconductor device 20 is picked and placed on the thermoplastic material by die attach means 21, with thermode to apply a higher temperature; and a third position 22 where thermode 19 is employed at a different temperature to securely laminate all of the elements together (col. 6, line 38 - col. 7, line 29).

Hoffman et al. teach that in making a chip electronic package that is both reworkable and does not require accurate control of adhesive placement, at least one semiconductor chip is bonded to a leadframe using an apertured substrate laminated to the support substrate of the leadframe. After an adhesive film 44 is placed on a preheated support substrate 20 of a leadframe and before a chip is bonded to the adhesive film, an apertured substrate is laminated to the support substrate using a pressure of 1-10 psi at cure temperature (250-375°C).

It would have been obvious to one of ordinary skill in the art to have modified the apparatus of Wood et al. by providing a means for pressing an apertured substrate onto the adhesive film on the leadframe and means for heating the leadframe while applying the apertured substrate as taught by Hoffman et al. for making a chip electronic package. Providing a position in

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the apparatus of Wood et al. after the first position, and before the second position, where a compression bonding element is provided to press the apertured substrate on the adhesive on the leadframe and where a heating element such as thermode is provided for heating the leadframe while pressing the apertured substrate on the leadframe would have been obvious to one of ordinary skill in the art as taught by Hoffman et al. for providing an apertured substrate on a leadframe before attaching a semiconductor device for forming a chip electronic package.

Allowable Subject Matter

(17)

Claims 8 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

(18)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references disclose attaching a chip to a leadframe.

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(19)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis Mayes, whose telephone number is (703) 308-1977. The examiner can normally be reached on Monday-Friday from 7:00 AM-3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Simmons, can be reached on (703) 308-1972.

The Official FAX phone number for this Tech Center 1700 is (703) 305-7718.

The Unofficial Fax phone number is (703) 305-7115.

When filing a FAX in Tech Center 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with PTO that are not for entry into the file of the application. This will expedite processing of your papers.

The receptionist number for Tech Center 1700 is (703) 308-0661.


CURTIS MAYES
PRIMARY EXAMINER

Art Unit 1734
December 15, 1998

LIST OF REFERENCES CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7426-0046

SERIAL NO.

To be assigned

APPLICANT

TAKEDA et al.

FILING DATE

June 25, 1997

GROUP

To be assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
MM	AA JP-A-2-256251	10/17/90	JAPAN with English language abstract	-	-		
MM	AB JP-A-54-12266	1/29/79	JAPAN with English language abstract	-	-		
MM	AC JP-A-54-138371	10/26/79	JAPAN with English language abstract	-	-		
	AD						
	AE						
	AF						
	AG						

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER

Mayes

DATE CONSIDERED

12/7/98

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/12/02 03/31/98 TAKEDA

S 7426-055
TMK0003

PENNIE & EDMONDS
1155 AVENUE OF THE AMERICAS
NEW YORK NY 10036

MMC1/0522

EXAMINER

GRAYBILL, D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED:

05/22/00

REFERRED TO
REC'D

MAY 25 2000

Pennie & Edmonds
O.K. for filing

HIND

T-out


Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

11/22/00

Office Action Summary

Application No. 08/981,702	Applicant(s) Takeda et al
Examiner David E. Graybill	Group Art Unit 2814



☒ Responsive to communication(s) filed on 7 Feb 2000

☒ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

- ☒ Claim(s) 1-25 is/are pending in the application.
- Of the above, claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-25 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claims _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been
- ☐ received.
- ☐ received in Application No. (Series Code/Serial Number) _____
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

- ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- ☒ Notice of References Cited, PTO-892
- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s) _____
- ☒ Interview Summary, PTO-413
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Interview Summary

Application No.

08/981 702

Applicant(s)

Takeda et al.

Examiner

David E. Graybill

Group Art Unit

2814



All participants (applicant, applicant's representative, PTO personnel):

(1) David E. Graybill(3) Charles Miller(2) Mami Hino

(4) _____

Date of Interview 10 Jan 2000Type: ☒ Telephonic ☐ Personal (copy is given to ☐ applicant ☐ applicant's representative).Exhibit shown or demonstration conducted: ☒ Yes ☒ No. If yes, brief description:Agreement ☐ was reached. ☒ was not reached.Claim(s) discussed: All in general.

Identification of prior art discussed:

Morita and Hozoji

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:

Discussed applicant's proposed amendments. On cursory consideration it could not be determined if the amendments would bring the application into condition for allowance.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

1. ☒ It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph above has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a response to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW.

2. ☐ Since the Examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the interview unless box 1 above is also checked.

Examiner Note: You must sign and stamp this form unless it is an attachment to a signed Office action.

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Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim, or amend the claim to place the claim in proper dependent form, or rewrite the claim in independent form. In particular, claim 14 improperly depends on claim 14.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-3, 6-9, 12, 19, 20, 22 and 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Morita (5406124).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35; column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30 Morita teaches the following:

1. A semiconductor device comprising a support member 21 a semiconductor chip 1, a die-bonding material 4 for attaching the semiconductor chip to the support member, and a resin encapsulant member 5 for encapsulating the semiconductor chip, wherein: said die-bonding material is a film comprising polyimide and epoxy resin; said film having a water absorption of

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1.5% by volume or less.

2. A semiconductor device comprising a support member 21 a semiconductor chip 1, a die-bonding material 4 for attaching the semiconductor chip to the support member, and a resin encapsulant member 5 for encapsulating the semiconductor chip, wherein: said die-bonding material is a film comprising polyimide and epoxy resin; said film having a residual volatile component in an amount not more than 3.0% by weight.

3. A semiconductor device comprising a support member 21 a semiconductor chip 1, a die-bonding material 4 for attaching the semiconductor chip to the support member, and a resin encapsulant member 5 for encapsulating the semiconductor chip, wherein; said die-bonding material is a film comprising polyimide and epoxy resin; said film having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

6. A semiconductor device comprising a support member 21 a semiconductor chip 1, a die-bonding material 4 for attaching the semiconductor chip to the support member, and a resin encapsulant member 5 for encapsulating the semiconductor chip, wherein: said die-bonding material is a film comprising polyimide and epoxy resin; said film i) having a planar dimension not larger than a planar dimension of the semiconductor chip, and ii) not protruding outward from a region of the semiconductor chip at a stage where the semiconductor chip has been bonded to the support member.

7. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with a die-bonding material 4, and encapsulating

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the semiconductor chip with a resin 5;

said die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; said filmy die-bonding material having a water absorption of 1.5% by volume or less.

8. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with a die-bonding material 4, and encapsulating the semiconductor chip with a resin 5; said die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; said filmy die-bonding material having a residual volatile component in an amount not more than 3.0% by weight.

9. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with a die-bonding material 4, and encapsulating the semiconductor chip with a resin 5; said die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; said filmy die-bonding material having a modulus of elasticity of 10 MPa or less at a temperature of 250 °C.

12. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with a die-bonding material 4, and encapsulating the semiconductor chip with a resin 5; said die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; said filmy die-bonding material i) having a planar dimension not larger than a planar dimension of the semiconductor chip, and ii) not protruding outward from a region of the semiconductor chip at a stage where the semiconductor chip has been bonded to the support member.

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19. A die-bonding material 4 for use in a process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with said die-bonding material, and encapsulating the semiconductor chip with a resin 5; said die-bonding material being a film comprising polyimide and epoxy resin; said film having a water absorption of 1.5% by volume or less.

20. A die-bonding material 4 for use in a process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with said die-bonding material, and encapsulating the semiconductor chip with a resin 5; said die-bonding material being a film comprising polyimide and epoxy resin; said film having a residual volatile component in an amount not more than 3.0% by weight.

22. A die-bonding material 4 for use in a process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with said die-bonding material, and encapsulating the semiconductor chip with a resin 5; said die-bonding material being a film comprising polyimide and epoxy resin; said film having a modulus of elasticity of 10 Mpa or less at a temperature of 250 °C.

23. The semiconductor device according to claim 1, 2, 3, 4, 5, or 6, wherein the polyimide is a thermoplastic.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yusa (5667899) and Masaomi (JP5-152355).

At column 1, line 63 to column 5, line 2; and column 13, lines 23-25 Yusa teaches the following:

6. A semiconductor device comprising a support member a semiconductor chip, a die-bonding material for attaching the semiconductor chip to the support member, wherein: said die-bonding material is a film comprising polyimide and epoxy resin; said film i) having a planar dimension not larger than a planar dimension of the semiconductor chip, and ii) not protruding outward from a region of the semiconductor chip at a stage where the semiconductor chip has been bonded to the support member.

23. The semiconductor device according to claim 1, 2, 3, 4, 5, or 6, wherein the polyimide

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is a thermoplastic.

24. The semiconductor device according to claim 23, wherein the polyimide is a polyimide synthesized from a combination which is selected from the group consisting of a combination of 1,2-(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5-dimethylphenyl)methane; a combination of 1,2(ethylene)bis(trimellitate anhydride) and 4,4'-diaminodiphenylether; a combination of 1,2-(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5diisopropylphenyl)methane; a combination of 1,2-(ethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane; a combination of a mixture of 1,2(ethylene)bis(trimellitate anhydride) and 1,10-(decamethylene)bis(trimellitate anhydride) being the same mol as the mixture and 2,2-bis[4-(4 aminophenoxy)phenyl] propane; and a combination of 1,10-(decamethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane.

25. The semiconductor device according to claim 1, 2, 3, 4, 5, or 6, wherein the die-bonding material contains a metal filler.

To further clarify the teaching "said film i) having a planar dimension not larger than a planar dimension of the semiconductor chip, and ii) not protruding outward from a region of the semiconductor chip at a stage where the semiconductor chip has been bonded to the support member." Attention is directed to column 13, lines 23-25, wherein the film as having the same planar dimensions as the chip. In any case, in the English abstract and figures Masaomi teaches a film i) having a planar dimension not larger than a planar dimension of a semiconductor chip, and

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ii) not protruding outward from a region of the semiconductor chip at a stage where the semiconductor chip has been bonded to a support member. Moreover, it would have been obvious to combine the product of Masaomi with the product of Yusa because it would facilitate chip bonding.

However, Yusa does not appear to explicitly teach a resin encapsulant member for encapsulating the semiconductor chip. Still, Masaomi teaches this product in the English abstract and drawings. Furthermore, it would have been obvious to combine the product of Masaomi with the product of Yusa because it would facilitate chip protection.

Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hozoji (JP5-218107) and Morita (5406124).

In the English abstract and Table 1, Hozoji teaches the following:

4. A semiconductor device comprising a support member "die pad", a semiconductor element, a bonding material "adhesive" for attaching the semiconductor element to the support member, and a resin encapsulant member "sealing resin" for encapsulating the semiconductor element, wherein: said bonding material is a film comprising epoxy resin; said film having, at a stage where the semiconductor element has been bonded to the support member, a void volume of 10% or less in terms of voids present in the bonding material and at an interface between the bonding material and the support member.

10. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor element to a support member "die pad" with a bonding material "adhesive", and

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encapsulating the semiconductor element with a resin; said bonding material comprising a filmy bonding material comprising epoxy resin; said filmy bonding material having, at a stage where the semiconductor element has been bonded to the support member, a void volume of 10% or less in terms of voids present in the bonding material and at an interface between the bonding material and the support member.

To further clarify the teaching of a void volume of 10% or less, it is noted that, as cited, Hozoji teaches that "a defect such as a void, etc., is eliminated."

Also, although Hozoji does not appear to literally teach a semiconductor "chip" and "die-bonding" material, as cited, Hozoji teaches a semiconductor element, bonding material and a die pad, and judicial notice is taken that it is well known to provide a semiconductor element as a semiconductor chip and to bond the chip to a die pad using element bonding adhesive as die bonding material. Moreover, it would have been obvious to combine the well known process with the process of Hozoji because it would facilitate adhesion.

However, Hozoji does not appear to explicitly teach a process and product comprising polyimide and epoxy resin. Regardless, Morita teaches this process at column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35; column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30. Additionally, it would have been obvious to combine the process and product of Morita with the process and product of Hozoji because it would provide an adhesive.

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Claims 5, 11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita (5406124).

Morita teaches the following:

5. A semiconductor device comprising a support member 21, a semiconductor chip 1, a die-bonding material 4 for attaching the semiconductor chip to the support member, and a resin encapsulant member 5 for encapsulating the semiconductor chip, wherein: said die-bonding material is a film comprising polyimide and epoxy resin; said film having a peel strength of 67g/10mm² chip at a stage where the semiconductor chip has been bonded to the support member.

11. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip 1 to a support member 21 with a die-bonding material 4, and encapsulating the semiconductor chip with a resin 5; said die-bonding material comprising a die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; said filmy die-bonding material having a peel strength of 67g/10mm² chip at a stage where the semiconductor chip has been bonded to the support member.

13. A process for fabricating a semiconductor device, comprising the steps of attaching a semiconductor chip to a support member 21 with a die-bonding material 4, and encapsulating the semiconductor chip with a resin 5; said die-bonding material comprising a filmy die-bonding material comprising polyimide and epoxy resin; the process further comprising the steps of mounting said semiconductor chip on said filmy die-bonding material; and attaching said

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semiconductor chip to said filmy die-bonding material under conditions of a temperature of 150°C to 250°C, bonding time of 0.1 (inclusive) second to 2 seconds, and a pressure of 10gf/mm² (1kg/cm²).

14. A process for fabricating a semiconductor device, according to any one of claims 8 to 13 and 14, further comprising the steps of mounting said semiconductor chip on said filmy die-bonding material; and attaching said semiconductor chip to said filmy die-bonding material under conditions of a temperature of 250°C, bonding time of 0.1 (inclusive) second to 2 seconds, and a pressure of 10gf/mm² (1kg/cm²).

However, Morita does not appear to literally teach a peel strength of 0.5 Kgf/5 x 5 mm chip or above. Moreover, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 Kgf/5 x 5 mm chip or above because the conversion factor between the two different peel strength measuring techniques is unknown. Nonetheless, as cited, Morita teaches that an increase in peel strength is desirable, and it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an

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unexpected result, or are otherwise critical.

Also, although as cited, Morita teaches a pressure of 10gf/mm^2 , Morita does not appear to explicitly teach a pressure of 0.1 to 4gf/mm^2 . Nevertheless, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed pressure range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Again, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.

Claims 15-18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 1-3, 6-9, 12, 19, 20, 22 and 23 supra, and further in combination with Hozoji (JP5-218107).

Morita does not appear to explicitly teach:

15. The semiconductor device as described in Claim 2 wherein said die-bonding material is a film containing an organic matter; said film having a saturation moisture absorption of 1.0% by volume or less.

16. A semiconductor device as described in Claim 6 wherein a die-bonding material is a film containing an organic matter; said film having a saturation moisture absorption of 1.0% by volume or less.

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17. The process for fabricating a semiconductor device as described in Claim 8 wherein said filmy die-bonding material has a saturation moisture absorption of 1.0% by volume or less.

18. The process for fabricating a semiconductor device as described in Claim 12 wherein said filmy die-bonding material has a saturation moisture absorption of 1.0% by volume or less.

21. The die-bonding material as described in Claim 20 wherein said film has a saturation moisture absorption of 1.0% by volume or less.

Regardless, in the English abstract and Table 1, Hozoji teaches the following:

A semiconductor device wherein a die-bonding material "adhesive" is a film containing an organic matter; said film having a saturation moisture absorption of 1.0% by volume or less.

A process for fabricating a semiconductor device wherein a filmy die-bonding material "adhesive" has a saturation moisture absorption of 1.0% by volume or less.

A die-bonding material "adhesive" wherein a film has a saturation moisture absorption of 1.0% by volume or less.

Furthermore, it would have been obvious to combine the product, process and composition of Hozoji with the process of the applied prior art because it would facilitate adhesion.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist at (703) 308-1782.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m..

The fax phone number for group 2800 is (703)305-3431.

David E. Graybill
Primary Examiner
Art Unit 2814

D.G.

Notice of References Cited

Application No.
08/981,702

Applicant(s)
Takeda et al.

Examiner
David E. Graybill

Group Art Unit
2814

Page 1 of 1

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	5,667,899	9/1997	Yusa et al.	----	----
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
X		

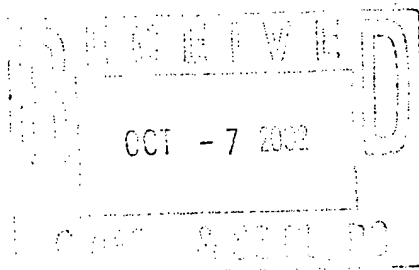


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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,436	02/20/2001	Shinji Takeda	TM&K0007	8173

7590 10/04/2002
Joerg-Uwe Szipl
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Arlington, VA 22204-2320



EXAMINER

GEYER, SCOTT B

ART UNIT PAPER NUMBER

2829

DATE MAILED: 10/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)
	09/785,436		MAEKAWA ET AL
	Examiner		Art Unit
	Scott B. Geyer		2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29,31,36-38 and 49-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38 and 49-54 is/are allowed.
- 6) ☒ Claim(s) 29,31,36,37 and 55-62 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/981,702.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9,10,15
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

1. This non-final office action addresses claims 29, 31, 36-38 and 49-62.

Election/Restrictions

2. The restriction requirement of the previous action, paper no. 16, is withdrawn.

Drawings

3. The drawings are objected to because numerals "3" and "4", from figures 1(a) and 1(b) are not disclosed in the specification. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: the specification does not recite details of numerals "3" and "4" from figures 1(a) and 1(b).
Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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6. Claims 31, 37 and 62 are rejected under 35 U.S.C. 102(a) as being anticipated by Morita et al. (5,406,124).

6A. As to **claim 31**, Morita et al. teach a die bonding material 4 in figure 1 used to attach a chip 1 to a support member (lead frame) 2. The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2.

6B. As to **claim 37**, Morita et al. teach a method of attaching a chip to a support member (lead frame) wherein a die bonding material 4 in figure 1 is used to attach a chip 1 to a support member (lead frame) 2 (see also column 7, lines 1 et seq.). The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2.

6C. As to **claim 62**, Morita et al. teach a die bonding material 4 in figure 1 used to attach a chip 1 to a support member (lead frame) 2. The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region

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of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame)

2. Morita et al. also teach encapsulating of the device with resin 3 in figure 1.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 29, 36, 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (5,406,124) in view of Yusa et al. (5,667,899).

8A. As to **claim 29**, Morita et al. teach a die bonding material 4 in figure 1 used to attach a chip 1 to a support member (lead frame) 2. The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2. Morita et al. do not teach a film having a peel strength of 0.5 Kgf/5x5mm chip or above, when the chip is attached to the support member. However, Yusa et al. does disclose peel strengths above 0.5 Kgf for a piece as large as 8x8mm (column 14, lines 26 et seq. and also Table 10). Yusa et al. further teaches attaching conductive bonding film pieces to semiconductor chips of similar dimensions, including: film of 4mm x 4mm and chip of 4mm x 4mm (column 13, lines 18-20) and film of 8mm x 8mm and chip of

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8mm x 8mm (column 14, lines 26-28). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the device of Morita et al. with an adhesive having a peel strength of 0.5 Kgf/5x5mm or above as taught by Yusa et al. so as to assure the chip and leadframe are securely bonded to each other.

As to **claim 60**, Morita et al. teach the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2, as shown in figure 1.

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8B. As to **claim 36**, Morita et al. teach a method of attaching a chip to a support member (lead frame) wherein a die bonding material 4 in figure 1 is used to attach a chip 1 to a support member (lead frame) 2 (see also column 7, lines 1 et seq.). The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2. Morita et al. do not teach a film having a peel strength of 0.5 Kgf/5x5mm chip or above, when the chip is attached to the support member. However, Yusa et al. does disclose peel strengths above 0.5 Kgf for a piece as large as 8x8mm (column 14, lines 26 et seq. and also Table 10). Yusa et al. further teaches attaching conductive bonding film pieces to semiconductor chips of similar dimensions, including: film of 4mm x 4mm and chip of 4mm x 4mm (column 13, lines 18-20) and film of 8mm x

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8mm and chip of 8mm x 8mm (column 14, lines 26-28). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Morita et al. with an adhesive having a peel strength of 0.5 Kgf/5x5mm or above as taught by Yusa et al. so as to assure the chip and leadframe are securely bonded to each other.

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8C. As to **claim 61**, Morita et al. teach a die bonding material 4 in figure 1 used to attach a chip 1 to a support member (lead frame) 2. The die bonding material is composed of an insulating adhesive tape that is made of a polyimide polymer (column 4, lines 26 et seq.). Further, as shown in figure 1, the insulating adhesive tape 4 has planar dimensions not larger than the chip 1 and is not protruding outward from a region of the chip 1 at a stage where the chip 1 is bonded to the support member (lead frame) 2. Morita et al. also teach encapsulating of the device with resin 3 in figure 1. Morita et al. do not teach a film having a peel strength of 0.5 Kgf/5x5mm chip or above, when the chip is attached to the support member. However, Yusa et al. does disclose peel strengths above 0.5 Kgf for a piece as large as 8x8mm (column 14, lines 26 et seq. and also Table 10). Yusa et al. further teaches attaching conductive bonding film pieces to semiconductor chips of similar dimensions, including: film of 4mm x 4mm and chip of 4mm x 4mm (column 13, lines 18-20) and film of 8mm x 8mm and chip of 8mm x 8mm (column 14, lines 26-28). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the device of Morita et al. with an adhesive

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having a peel strength of 0.5 Kgf/5x5mm or above as taught by Yusa et al. so as to assure the chip and leadframe are securely bonded to each other.

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9. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (5,406,124) and Yusa et al. (5,667,899) as applied to claim 29 above, and further in view of Sutton, Jr. (4,358,581).

As to **claim 55**, neither Morita et al. nor Yusa et al. teach a film with a modulus of elasticity (Young's modulus) of 10 MPa or less at a temperature of 250°C.

Sutton, Jr. teaches a Young's modulus for a polyimide film of 2350 MPa at 25°C and 1400 MPa at 200°C. Sutton, Jr. does not specifically teach the instant Young's modulus of 10 MPa at 250°C. However, Sutton, Jr. does teach that the Young's modulus for a specific film will decrease as the temperature increases. Thus, the skilled artisan would find obvious to employ without undue experimentation the instant Young's modulus at the given temperature for a specific film, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges for a result-effective variable involves only routine skill in the art. *In re Aller*, 105 USPQ 233. The skilled artisan would find obvious that modifying the type of film used and the film's temperature, the instant Young's modulus would be attained. Further, the applicant has not specifically recited for which film the Young's modulus (modulus of elasticity) value is recited. The applicant should also note that when the structure recited in a reference is substantially identical to that of the claim, claimed properties, in this example a Young's modulus of a material, are presumed to be

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inherent. Also, for composition claims, if the composition is physically the same, it must have the same properties. See MPEP 2112.01.

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10. Claims 56 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (5,406,124) and Yusa et al. (5,667,899) as applied to claim 29 above, and further in view of Inoue et al. (5,728,473).

As to **claim 56**, neither Morita et al. nor Yusa et al. teach a film having water absorption of 1.5% by volume or less. However, Inoue et al. teach an adhesive polyimide with water absorption of not more than 1 wt. %, and that the adhesive polyimide is preferably in the form of a film (column 3, lines 63-67, continued to column 4, lines 1-3). These polyimide adhesive films are used to bond semiconductor chips to lead frames (column 1, lines 14-22). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the device of Morita et al. and Yusa et al. with a film having a low water absorption percentage as taught by Inoue et al. since the greater presence of water can lead to deleterious effects on the semiconductor chip and lead frame to which the adhesive is attached.

As to **claim 58**, Inoue et al. teach an adhesive polyimide with water absorption of not more than 1 wt. %, and that the adhesive polyimide is preferably in the form of a film (column 3, lines 63-67, continued to column 4, lines 1-3).

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11. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (5,406,124) and Yusa et al. (5,667,899) as applied to claim 29 above, and further in view of Suzuki et al. (5,234,522).

As to **claim 57**, neither Morita et al. nor Yusa et al. teach a film having a residual volatile component of 3.0% by weight or less. However, Suzuki et al. teach a residual volatile matter of not more than 1.5% by weight and preferably not more than 1% (column 3, lines 59-62). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the device of Morita et al. and Yusa et al. with a low residual volatile percentage as taught by Suzuki et al. since a high residual volatile component remaining in adhesives would cause the adhesive to peel and have voids, both of which are undesirable for bonding chips to lead frames.

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12. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (5,406,124) and Yusa et al. (5,667,899) as applied to claim 29 above, and further in view of Schuft (5,141,050).

As to **claim 59**, neither Morita et al. nor Yusa et al. teach a void volume of 10% or less of the die-bonding material (adhesive) and at an interface between the adhesive and the support member (lead frame) when the chip has been attached to the lead frame. However, Schuft teaches a void volume of 10% or less (column 4, lines 6 et seq.) for adhesive material, or thermal conduit (column 2, lines 42 et seq.). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the device of Morita et al. and Yusa et al. with a low void volume percentage as

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taught by Schuft as a void volume could trap air and moisture, which would have deleterious effects upon the chip and lead frame for which the adhesive is used to attach together.

Allowable Subject Matter

13. Claims 38 and 49-54 are allowed.

14. The following is a statement of reasons for the indication of allowable subject matter: independent claim 38 recites a process for fabricating a semiconductor device comprising attaching a chip to a support member with a die bonding material. The claim further recites temperature conditions of 150°C to 250°C, a bonding time of 0.1 (inclusive) to 2 seconds and a pressure of 0.1 to 4 gf/mm². The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan the instant invention, regarding the bonding limitations as recited by independent claim 38, specifically to the temperature, time and pressure conditions. Claims 49-54, which are dependent upon claim 38, are also allowable.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. The examiner may also be reached via e-mail: scott.geyer@uspto.gov

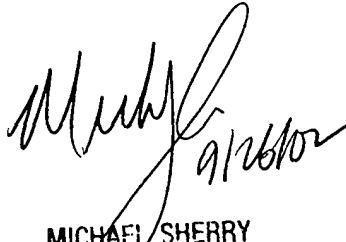
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J. Sherry can be reached on (703) 308-1680. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.B.G.

S.B.G.
September 19, 2002


MICHAEL SHERRY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Notice of References Cited

Application/Control No.

09/785,436

Applicant(s)/Patent Under

Reexamination

MAEKAWA ET AL

Examiner

Scott B. Geyer

Art Unit

2829

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
1	A	US-4,358,581	11-1982	Sutton, Jr.	528/353
2	B	US-5,728,473	03-1998	Inoue et al.	428/448
3	C	US-5,234,522	08-1993	Suzuki et al.	156/249
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

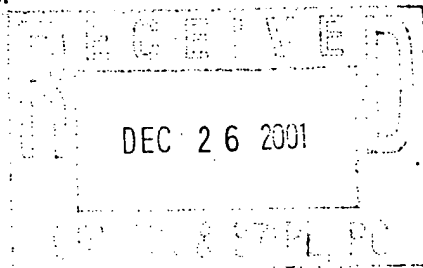


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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,486	02/20/2001	Shinji Takeda	TM&K0008	9092

7590 12/19/2001
Joerg-Uwe Szipl
Griffin & Szipl, P.C.
Suite PH-1
2300 Ninth Street, South
Arlington, VA 22204-2320



EXAMINER	
GRAYBILL, DAVID E	
ART UNIT	PAPER NUMBER

2814

DATE MAILED: 12/19/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/85,486

Applicant(s)

SHINJI TAKEDA

Examiner

David E Graybill

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/981,702.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,7,9-11
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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The amendment filed 2-20-01 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure.

35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is the claim 40 limitation, "said material is an organic material comprising . . . 4,4'-diaminophenyl ether."

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim 40 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The non-described subject matter is the limitation, "said material is an organic material comprising . . . 4,4'-diaminophenyl ether."

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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In the rejections *infra*, reference labels are generally recited only for the first recitation of identical claim language.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 18, 19, 21 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Morita (5406124).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35; column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30, Morita teaches the following:

18. A material 4 comprising an organic die-bonding film having the property of bonding a semiconductor chip 1 to a support member 2 under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², and having a saturation moisture absorption of 1.0% by volume or less.

19.. A material comprising an organic die-bonding film having the property of bonding a semiconductor chip to a support member

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under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², and having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

21. A material comprising an organic die-bonding film having the property of bonding a semiconductor chip to a support member under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², having a residual volatile component in an amount of not more than 3.0% by weight.

22. A material comprising an organic die-bonding film having the property of bonding a semiconductor chip to a support member under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², having a water absorption of 1.5% by volume or less.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered

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therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 17, 23-27, 31, 33, 35, 37, and 42-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita (5406124).

As cited, Morita teaches the following:

17. A material comprising an organic die-bonding film having a peel strength when a semiconductor has been bonded to a support material under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm².

23. A material according to 17, comprising an organic die-bonding film further having a modulus of elasticity of 10 Mpa or less at a temperature of 250°C.

24. A material according to 23, comprising an organic die-bonding film further having a water absorption of 1.5% by volume or less.

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25. A material according to 24, comprising an organic die-bonding film further having a residual volatile component in an amount of not more than 3.0% by weight.

26. A material according to 25, comprising an organic die-bonding film further having a saturation moisture absorption of 1.0% by volume or less.

27. A material according to 26, comprising an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said material and a support member at a stage where a semiconductor had been bonded to a support member by said material.

31. A material according to 17, being a self-supporting film.

33. A material according to 17, having a single layer structure.

35. A material according to 17, wherein said material is an organic material comprising one or more components selected from the group consisting of epoxy resin, silicone resin, acrylic resin, and polyimide resin.

37. A material according to 17, wherein said material is an organic material comprising a polyimide resin.

42. A material according to 17, wherein said material is an organic material comprising a polyimide synthesized from 1,2-

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(ethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane.

43. A material according to 17, wherein said material is an organic material comprising a polyimide synthesized from 1,2-(ethylene)bis(trimellitate anhydride), 1,10-(decamethylene)bis(trimellitate anhydride, and 2,2-bis[4-(4aminophenoxy)phenyl] propane.

44. A material according to 17, wherein said material is an organic material comprising a polyimide synthesized from 1,10-(decamethylene)bis(trimellitate anhydride), and 2,2-bis[4-(4aminophenoxy)phenyl] propane.

45. A material according to 17, wherein said material is an organic material comprising an epoxy resin.

46. A material according to 17, wherein said material is an organic material comprising a polyimide resin and an epoxy resin.

47. A material according to 35, further comprising a metal filler.

48. A material according to 36, further comprising a metal filler.

49. A material according to 36, made by a process comprising the steps of coating a varnish on a carrier film and peeling the die bonding material from said carrier film.

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50. A material according to 36, made by a process comprising the steps of coating a varnish on a carrier film and peeling the die bonding material from said carrier film.

Although Morita teaches a material at a stage where a semiconductor has been bonded to a support member using the material, Morita does not appear to explicitly teach that the material has a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher at the stage.

Furthermore, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 Kgf/5 x 5 mm chip or above because the conversion factor between the two different peel strength measuring techniques is unknown. Nonetheless, as cited, Morita teaches that an increase in peel strength is desirable, and it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Indeed, it has been held that

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optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.

In the interest of compact prosecution, applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that is reasonably necessary to the examination of this application.

In response to this requirement, please state the specific improvements of the subject matter in claim 30, specifically, the limitation, "a peel strength of 0.5 Kgf/5 x 5 mm chip or higher" over the disclosed teaching of Morita of a 90 degree peel strength of 67g/10mm², and indicate the specific elements in the claimed subject matter that provide those improvements.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period

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for reply to this requirement coincides with the time period for reply to the enclosed Office action.

Although Morita does not appear to explicitly teach the process limitations "coating a varnish on a carrier film and peeling the die bonding material from said carrier film," the product of Morita inherently possesses the structural characteristics imparted by the process limitation. See *In re Fitzgerald, Sanders, and Bagheri*, 205 USPQ 594 (CCPA 1980).

Claims 20, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 18, 19, 21 and 22, and further in combination with Hozoji (JP5-218107).

As cited, Morita teaches the following:

20. A material comprising an organic die-bonding film having the property of bonding a semiconductor chip to a support member under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², at a stage where a semiconductor has been bonded to a support member by said material.

However, Morita does not appear to explicitly teach a void volume of 10% or less in terms of voids present in the material and at an interface between said material and a support member.

Nonetheless, in the English abstract and Table 1, Hozoji teaches a material having a void volume of 10% or less in terms of voids present in the material and at an interface between

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said material and a support member. Moreover, it would have been obvious to combine the product of Hozoji with the product of Morita because it would facilitate adhesion.

To further clarify the teaching of a void volume of 10% or less, it is noted that Hozoji teaches that a defect such as a void, etc., is eliminated.

In addition, in the combination, Morita teaches the following:

28. A material according to 20, comprising an organic die-bonding film further having a water absorption of 1.5% by volume or less, having a saturation moisture absorption of 1.0% by volume or less, and having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

29. A material according to claim 20, comprising an organic die-bonding film further having a saturation moisture absorption of 1.0% by volume or less, having a modulus of elasticity of 10 MPa or less at a temperature of 250°C, and having a peel strength.

Although Morita teaches a material at a stage where a semiconductor has been bonded to a support member using the material, Morita does not appear to explicitly teach that the material has a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher at the stage.

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Furthermore, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 Kgf/5 x 5 mm chip or above because the conversion factor between the two different peel strength measuring techniques is unknown. Nonetheless, as cited, Morita teaches that an increase in peel strength is desirable, and it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.

Claims 30, 32, 34, 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 17, 23-27, 31, 33, 35, 37, and 42-50, and further in combination with Hozoji (JP5-218107).

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As cited, Morita teaches the following:

30. A material comprising an organic die-bonding film having the property of bonding a semiconductor chip to a support member under conditions of 100-250°C temperature and pressure of 0.1-30 gf/mm², and having a water absorption of 1.5% by volume or less, a saturation moisture absorption of 1.0% by volume or less, a modulus of elasticity of 10 MPa or less at a temperature of 250°C, at a stage where a semiconductor has been bonded to a support member by said material, a peel strength at a stage where a semiconductor has been bonded to a support member with said material, and a residual volatile component in an amount of not more than 3.0% by weight.

However, Morita does not appear to explicitly teach a void volume of 10% or less in terms of voids present in the material and at an interface between said material and a support member, and a saturation moisture absorption of 1.0% by volume or less.

Nonetheless, in the English abstract and Table 1, Hozoji teaches a material having a void volume of 10% or less in terms of voids present in the material and at an interface between said material and a support member, and a saturation moisture absorption of 1.0% by volume or less. Moreover, it would have been obvious to combine the product of Hozoji with the product of Morita because it would facilitate adhesion.

To further clarify the teaching of a void volume of 10% or less, it is noted that Hozoji teaches that a defect such as a void, etc., is eliminated.

In addition, in the combination, Morita teaches the following:

32. A material according to 30, being a self-supporting film.

34. A material according to 30, having a single layer structure.

36. A material according to 30, wherein said material is an organic material comprising one or more components selected from the group consisting of epoxy resin, silicone resin, acrylic resin, and polyimide resin.

38. A material according to 30, wherein said material is an organic material comprising a polyimide resin.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 17, 23-27, 31, 33, 35, 37, and 42-50, and further in combination with Jackson (4965331).

Morita does not appear to explicitly teach the following:

39. A material according to 17, wherein said material is an organic material comprising bis(4-amino-3,5-dimethylphenyl)methane.

Nevertheless, as cited, Morita teaches an "aromatic diamine," and at column 2, lines 41-59, Jackson teaches an

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organic material comprising the aromatic diamine bis(4-amino-3,5-dimethylphenyl)methane. In addition, it would have been obvious to combine the product of Jackson with the product of Morita because it would provide an aromatic diamine.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 17, 23-27, 31, 33, 35, 37, and 42-50, and further in combination with Kunimune (4656238).

Morita does not appear to explicitly teach the following:
40. A material according to 17, wherein said material is an organic material comprising 4,4'-diaminophenyl ether.

Notwithstanding, as cited, Morita teaches an "aromatic diamine," and at column 18, lines 29-30, Kunimune teaches an organic material comprising the aromatic diamine 4,4'-diaminophenyl ether. In addition, it would have been obvious to combine the product of Kunimune with the product of Morita because it would provide an aromatic diamine.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 17, 23-27, 31, 33, 35, 37, and 42-50, and further in combination with Baumann (5296567).

Morita does not appear to explicitly teach the following:

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41. A material according to 17, wherein said material is an organic material comprising bis(4-amino-3,5-diisopropylphenyl)methane.

Notwithstanding, as cited, Morita teaches an "aromatic diamine," and at column 5, lines 4-34; and column 5, lines 1-5, Baumann teaches an organic material comprising the aromatic diamine bis(4-amino-3,5-diisopropylphenyl)methane. In addition, it would have been obvious to combine the product of bis(4-amino-3,5-diisopropylphenyl)methane with the product of Morita because it would provide an aromatic diamine.

This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist whose telephone number is 703-308-1782.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/305-3431.

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David E. Graybill
Primary Examiner
Art Unit 2814

D.G.
17-Dec-01

Notice of References Cited

Application/Control No.

09/785486

Applicant's/Patent Under

Reexamination
SHINJI TAKEDA

Examiner

David E. Graybill

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U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
COP 150	A	US-4965331	10-1990	Jackson et al.	
	B	US-4656238	04-1987	Kunimune et al.	
	C	US-5296567	03-1994	Baumann et al.	
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.